

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A heterostructure bipolar transistor characterized in that constituent devices of a compound semiconductor forming a base layer contain at least Ga, As, and Sb, and constituent devices of a compound semiconductor forming an emitter layer contain at least In, Al, and P, comprising:

a substrate made of InP;

a collector layer formed on said substrate and made of a compound semiconductor containing indium and phosphorus;

a base layer formed on said collector layer and made of a p-type compound semiconductor containing gallium, arsenic, and antimony, said base layer containing carbon added as a dopant;

an emitter layer formed on said base layer and made of a n-type compound semiconductor containing indium, aluminum and phosphorus;

wherein at least one $\text{GaAs}_x\text{Sb}_{(1-x)}$ layer is used in said base layer and at least one $\text{In}_{(1-y)}\text{Al}_y\text{P}$ layer is used in said emitter layer, where x and y represent an As content and an Al content, respectively, in a mixed crystal composition;

wherein said As content x is in the range of $0.45 \leq x \leq 0.55$ and said Al content y is in the range of $0 < y \leq 0.25$, with x and y satisfying the formula $0.49x + 1.554y > 0.36$;

wherein a composition ratio of indium to aluminum in said emitter layer is in a range within which a potential energy in a conduction band edge of said emitter layer close to said base layer side is higher than that in a conduction band edge of said base layer.

2-6. (Cancelled)

7. (Original) A heterostructure bipolar transistor according to claim 1, characterized in that the composition ratio of Al in said emitter layer decreases away from said base layer.

8. (Original) A heterostructure bipolar transistor according to claim 1, characterized in that the composition ratio of As in said base layer decreases away from said emitter layer.

9. (Original) A heterostructure bipolar transistor according to claim 1, characterized in that said collector layer is made of a compound semiconductor containing indium, aluminum, and phosphorus.

10. (Original) A heterostructure bipolar transistor according to claim 9, characterized in that

said base layer is made of $\text{GaAs}_{(x)}\text{Sb}_{(1-x)}$,

said collector layer is made of $\text{In}_{(1-z)}\text{Al}_{(z)}\text{P}$, and

x and z represent mixed crystal compositions and fall within ranges of $0 < x < 1$ and $0 < z < 1$, respectively.

11. (Currently Amended) A heterostructure bipolar transistor according to claim 10, ~~characterized in that~~ wherein:

~~that said content z is in the range of the composition y is $0 < yz \leq 0.18$; and~~

~~the relationship between x and y is~~ said contents x and z satisfy a formula

$0.49x + 1.554z \leq 0.36$.

12. (Original) A heterostructure bipolar transistor according to claim 9, characterized in that the composition ratio of Al in said collector layer decreases away from said base layer.

13. (Currently Amended) A heterostructure bipolar transistor according to ~~claim 4~~ claim 10, ~~characterized in that~~ wherein:

layers including said base layer and emitter layer forming the heterostructure bipolar transistor are formed by metal organic chemical vapor deposition, ~~and carbon is doped as a dopant to said base layer.~~

14. (Original) A heterostructure bipolar transistor according to claim 13, characterized in that said base layer is formed at a growth temperature of not less than 480 °C.